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Assessing Export Platforms: The Case of the Maquiladora Sector in Mexico

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The Case of the Maquiladora Sector in Mexico[1]

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I. Introduction

In the last two decades, Mexico has transformed from a protected, inward-looking nation to become a member in what will be the largest free trade area in the world. This has occurred because a succession of governments decided to fundamentally reorient the country's economic philosophy from that of protecting domestic industry to soliciting foreign investment and promoting exports. They succeeded. By 1996, Mexican exports had surpassed ten billion dollars, making it the largest exporter in Latin America and the tenth largest in the world. Foreign direct investment reached eight billion dollars.

The maquiladora sector has been both a catalyst and a beneficiary of this liberalization. Now employing over one million people, it has grown in step with the reform of the economy and despite the difficult business cycle fluctuations that have taken place along the way. In the process, the maquiladora industry has transformed the border region with the United States from one of the poorest to one of the most vibrant in Mexico.

The word *maquila* originally meant the portion of flour that millers would keep as a fee after grinding (adding value) to farmers' corn. It is now used to describe operations set up in Mexico that assemble or otherwise add value to intermediate inputs imported from abroad for re-exportation. This paper is an investigation of the development of that sector, the explanations for its success, and its impact on the economic development of Mexico.

The paper will argue that Mexico's unique geographic advantages and its largely, and increasingly, sensible policies toward the sector and toward openness in general, have created a dynamic and important industry that has helped modernize the economy and improve the lives of its citizens. It will also argue that Mexico must take specific, targeted steps to capitalize on the success it has achieved to date, improve the sector's linkages with the rest of the economy and improve country's global competitive position. Specifically, Mexico should take steps to improve the productivity of the maquila sector and increase the value added produced in Mexico. This will mean attracting specific kinds of industries, rather than simply targeting higher investment volumes.

The paper is divided into five sections. Part I describes generally the growth and legislative history of the maquiladora sector in the context of Mexico's liberalization program. It then summarizes the legislative rules and incentives for the Maquila Program today, and in the future under the NAFTA. Part II describes the current state of the maquila sector: its geographical, industrial, and ownership structure, etc. Part III investigates Mexico's competitive advantages and evaluates the environment for conducting business in Mexico. This section (and the next) incorporate a survey of maquiladora owners and managers in Mexico, as well as others involved in the program. Part IV investigates the economic impact of the maquila sector. Part V concludes with policy recommendations and research extensions.

II. Background and History

After world War II, the United States legalized the status of the migrant labor coming from Mexico to work on large farms in the United States in a program called the *bracero program.* When this program was terminated in 1964, the Mexican government (in 1965) introduced the *Border Industrialization Program* (BIP) as a policy to employ these migrant workers and combat

the high level of unemployment and economic depression in the border region—a region that had always had much lower levels of per capita income than the rest of the country.

It was a program to attract foreign direct investment to the border. It allowed one hundred percent foreign ownership of operations within a twenty kilometer strip of the border and in Baja California, temporary work permits for foreigners, and the ability to import machinery and materials duty free on a temporary in-bond basis, as long as these materials were eventually exported. Except for location and domestic sales restrictions, maquilas were registered as Mexican companies, subject to the same laws and tax regulations as domestic corporations. This ability to import intermediate inputs temporarily duty free remains the heart of the Maquila Program, although, as the section will show, the program has been liberalized both legislatively and administratively.

Although Baja California Norte had previously been operating as a kind of free trade zone, this BIP program was very much the exception in Mexico. During this time, the ruling economic ideology was based on self- sufficiency, the protection of domestic industry, and the need to limit foreign participation in the economy. On the trade front, policy was characterized by high and variable tariff rates, quota restrictions, foreign exchange controls and other barriers to trade such as import licensing requirements, called "prior import permits". In 1982, almost all imports required this permit.

Foreign investment was also severely limited. Under the 1973 investment law, broad areas of the economy, including petroleum and other forms of energy, railroads, electricity, automotive transportation, radio and television were off limits to foreigners. In the other sectors, foreign ownership was restricted to forty-nine percent, and approvals were based on investment qualifications such as domestic employment criteria, domestic input criteria, and balance of payments considerations, etc. It extended the area of maquila operations, but still restricted them from areas of high industrial concentration. As a result of these policies, by 1985 Mexico still had the lowest foreign investment/GDP ratio of any large non-socialist country (five percent).[3] Furthermore, by severely limiting non-debt investment, it was a partial, structural contribution to the debt crisis.

Mexico's inward looking policies and import substation program were made possible by the discovery of huge oil reserves, and the increasing price of oil during this period. But after the economic crisis and devaluation of 1982, the government began to change policy direction and started to liberalize and open the economy to foreign trade and investment, although these measures remained limited in scope for the first two years. In 1985, it implemented a major liberalization of its foreign trade regime. In 1983, the regulations and administration of the maquila sector were also liberalized.[4] Domestic sales of up to twenty percent of total sales were permitted and the sector was placed entirely under the jurisdiction of one ministry, the Ministry of Commerce and Industrial Development (SECOFI). This greatly simplified the administration of the program.

In May of 1989, major changes were enacted to the original 1973 foreign investment legislation. First, investment restrictions were limited to 41 sectors. On the rest, equity restrictions were removed and approvals were granted as long as the investment was less than 100 million dollars and met five other criteria. Land was also allowed to be held in thirty year trusts on the coast and

[3] IMF, 1993

[4] Although the *Border Industrialization Program* began in 1965, legislation regarding its regulation was not codified until 1971. *Sklair, 1989.*

border regions (land ownership by foreigners in these regions is still prohibited). In December of 1989, the Government set up the Decree for the Development and Operation of the Maquiladora Export Industry, which further liberalized the maquiladora industry.

The Maquila Program today and under NAFTA

When Mexico signed the North American Free Trade Agreement (NAFTA) with the United States and Canada, the 1989 decree was then amended further to comply with NAFTA rules and regulations. NAFTA went into effect in January of 1994. Today, the Maquila Program allows companies to import in-bond and duty-free all machinery, tools, equipment, and raw materials necessary to assemble and manufacture products for export. Companies may reexport the finished or semi-finished product from Mexico or may sell it in the Mexican market, subject to certain restrictions.[5] Foreign investors may own 100 percent of the equity in the maquilas, and they are registered as Mexican companies.

Under the NAFTA, until January, 2001, the maquila sector will be affected by both the continued reduction of import duties on those goods exported to the United States (assuming that they satisfy rules of origin requirements), and the increasing access to the Mexican market. During this time, the maquila sector will continue to be able to import raw materials duty free. After 2001, all maquila production will be able to be sold domestically, but the sector will lose its special tariff status. That is, it will operate under the rules of NAFTA, and any imported raw materials that do not originate in the U.S., Mexico, or Canada will be subject to duty.

A summary of the amended 1989 decree, which lays out the rights, regulations and procedures for operating a maquiladora in Mexico is attached as Appendix 1.

The Maquiladora and the PITEX Programs

Beyond the Maquila Program, domestic or foreign exporters may export under the Temporal Importation Program to Produce Articles for Exportation (PITEX). PITEX is more oriented toward domestic companies wishing to expand their operations to export operations, whereas the Maquila Program is intended more for companies engaged purely in exporting. The PITEX Program was established in 1990 and was amended in 1995 and 1996 to bring it into greater accord with the Maquila Program. A company operating under one program can apply for benefits under the other program, as long as both programs are not applied to the same goods. However, the PITEX Program is little known and little used by foreign investors.[6]

Both programs allow for duty-free imports of raw materials, under certain provisions. The major difference in the programs is that in order to import raw materials duty-free, the PITEX Program requires that 10 percent of total sales, or that a total amount of $500,000 in sales is exported. This allows for a larger portion of total sales to be sold domestically (close to even 100 percent if the export value minimum is met). However, as stated, domestic sales under the Maquila Program become more liberal each year, until 100 percent is allowed in 2001. The Maquila Program is also administratively more simple, as a maquila owner submits the necessary forms to SECOFI, which

[5] The percentage is indexed as an increasing percentage of the previous year's exports, until 2001, when they may sell 100 percent to the domestic market, but will be subject to the full regulations of the NAFTA program. See Appendix I for full details.

[6] According Rice, in *PITEX and Maquiladora Import Programs: A Working Guide and Comparative Evaluation*, there is a "lack of information both inside and outside of Mexico on this program". Mexican attorneys are largely unfamiliar with it, and he has yet to find a translation of PITEX provisions.

then handles the registration with other government agencies. This is not expressly available under the PITEX Program.

The growth of the maquila sector

The maquila sector has grown enormously during this time. A full history of its development is beyond the scope of this paper, but a detailed account is given in Sklair's 1989 book, *Assembling for Development: The Maquila Industry in Mexico and the United States*. She divides its growth into three main phases. The first marked its initial growth until its temporary setback in the early 1970s (due to an overvalued exchange rate, a recession in the United States, and labor unrest); this period ended with the devaluation of 1976. Phase II marked its rapid recovery—and a near doubling of maquila employment, which then tapered off until the massive devaluation of 1982. The 1980s (phase III) brought unprecedented growth to the sector, due to a series of liberalization measures and currency devaluations. The industry was given an extra boost by NAFTA, and has achieved an average growth rate of over ten percent during the 1990s. Table 1 shows the growth of plants and employees during this period.

Table 1. Plants and employees in the maquila industry, 1964–98.

Year	Plants	Growth	Employees	Growth	Year	Plants	Growth	Employees	Growth
1967	72	…	4000	**…**	**1983**	600	3%	150867	19%
1968	112	56%	10927	173%	**1984**	672	12%	199684	32%
1696	149	33%	15900	46%	**1985**	760	13%	211968	6%
1970	160	7%	20327	28%	**1986**	890	17%	249833	18%
1971	205	28%	28483	40%	**1987**	1125	26%	305253	22%
1972	339	65%	48060	69%	**1988**	1396	24%	369489	21%
1973	400	18%	64330	34%	**1989**	1655	19%	429725	16%
1974	455	14%	75974	18%	**1990**	1938	17%	460258	7%
1975	454	0%	67214	-12%	**1991**	1914	-1%	467352	2%
1976	448	-1%	74496	11%	**1992**	2075	8%	505698	8%
1977	443	-1%	78433	5%	**1993**	2166	4%	540927	7%
1978	457	3%	90704	16%	**1994**	2064	-5%	600585	11%
1979	540	18%	111365	23%	**1995**	2267	10%	681251	13%
1980	620	15%	119546	7%	**1996**	2553	13%	803060	18%
1981	605	-2%	130973	10%	**1997**	2867	12%	938438	17%
1982	585	-3%	127048	-3%	**1998**	3012	5%	1021724	9%

Source: SECOFI, through 1992; *Twin Plant News*, through 1998.

III. The Structure of the Maquiladora Sector

This section describes the evolution of the structure of the maquila sector in Mexico, with an emphasis on its regional variations. It is examined along the following dimensions: regional distribution, sectoral distribution, and ownership distribution. Official data is supplemented with a data set built from a directory of Twin Plant operators in Mexico, which lists more detailed information on Twin Plant location and activities than many official sources.

Regional distribution

The location restriction on maquiladoras was abolished in 1972. Now, each of Mexico's thirty-one states has a maquila plant. Table 2 shows the percentage of total maquila workers by state.

Table 2. Maquila workers by state.

State	% of total maquila workers
Chihuahua	26.8%
Baja California	21.4%
Tamaulipas	14.5%
Coahuila	9.2%
Sonora	8.7%
Nuevo Leon	4.6%
Other States	15.8%

Source: *Twin Plant News,* August, 1998.

Two-thirds of the maquilas in Mexico are located in a state that borders the United States. The two most important are Chihuahua, which contains approximately 485 maquilas, 370 of which are found in Ciudad Juarez; and Baja California Norte, which contains approximately 718 maquilas, 415 of which are located in Tijuana. The state of Sonora, also on the border, has only 185 maquilas. Interior states contain even fewer. For example, Zacatecas contains 14, Durango contains 84, and Jalisco, 51.

However, the growth of maquilas in the interior has been much faster than the maquila growth on the border, growing twice as fast as those on the border between 1973 and 1983. Since 1994, more than fifty percent of new maquilas have located outside of the northern boundary region[7]. By March of 1998, there were 2,288 maquilas in Mexico, 781 (34%) of which were in the interior. The growth of maquilas in the interior is given in table 3.

Table 3. Enterprises and employment of interior maquiladora plants 1974–95.[a]

Year	Plants	Share of total	Employment	Share of total
1973	10	4%	4200	7%
1975	36	8%	510	8%
1980	69	11%	13000	11%
1983	67	11%	16000	11%
1990	485	25%	...	…
1995	659	31%	77900[b]	11%[b]

[a]Annual average. [b]End of year.

Source: *INEGI,* quoted from Weintraub (1990); Mendiola (1996), obtained from Sander (1997).

This movement to the interior is important in that it helps spread the employment benefits of foreign investment throughout the country and fosters backward linkages to domestic industry.

Regional variation in the size of maquilas. The average size of maquiladoras varies significantly by region. For example, in Chihuahua, 17% of the maquilas have over 1,000 employees. In Baja

[7] Naftaworks, 1998.

California Norte, on the other hand, over half of the maquilas have 100 or less employees. The average number of employees per plant in Juarez (575) is over twice that of Tijuana (262). See table 4.

Table 4. Percentage of industry by size.

Size	Chihuahua	Baja Cal Norte
1001 +	17.00%	4.00%
501–1000	18.00%	7.00%
251–500	18.00%	13.00%
101–250	23.00%	24.00%
1–100	24.00%	52.00%

Source: *Solunet Twin Plant Guide*, 1998.

The differences persist across sectors. For example, in Juarez, the biggest plants are in the electronics (785 employees on average), apparel (689), and business services (699). The three biggest plants in Tijuana are in electronics (350), plastics (335), and instruments. Some of this difference reflects differences in industrial concentrations, but it is interesting to note that while apparel operations are among the largest in Juarez, they are small operations in Tijuana. In Tijuana, the apparel industry has the *smallest* number of employees per plant of the fourteen largest industries represented (109 people). Sklair notes that this was an important reason that the maquila industry in Juarez was better able to weather Mexico's economic crises than that in Tijuana.

Sectoral distribution

While maquila activity in all industries has grown in absolute terms, the industry distribution of maquila plants has changed markedly over the years. The industry distribution in terms of number of plants and total number of employees for 1979, 1985, and 1998 is shown in table 5.

Table 5. Distribution of plants by industrial activity.

Activity	**1979**		**1985**		**1998**	
	Number of Plants	**Employees**	**Number of Plants**	**Employees**	**Number of Plants**	**Employees**
Electrical, electronic materials, etc.	124	34797	193	57083	480	262540
Textiles, apparel	122	17631	108	21473	847	207782
Auto equipment and accessories	38	5035	63	40145	210	189668
Other manufacturing sectors	54	7775	105	13904	451	115976
Electronic machinery and equipment	56	28664	81	44776	138	91672
Wooden, metallic, furniture and parts	54	3515	74	6522	353	49373
Services	30	6524	38	12936	164	40998
Chemical products	…	…	3	92	129	20482
Toys and sporting goods	16	2454	26	7265	62	13785
Equipment & tools (non-electric)	14	18034	21	2386	42	10506
Food processing	12	1481	12	1855	79	9884
Shoes and Leather goods	20	1655	36	4531	57	9058

Source: 1998, *Twin Plant News*, 1979, 1985; *INEGI*, from Sklair.

Electronics and apparel have always been the two most important sectors. But the transport equipment sector has grown enormously, from sixth place in 1986 to third place in 1998. Table 6 shows the growth trends more clearly, and highlights the decreasing relative importance of the apparel sector in Mexico.

Table 6. Sectoral structure of the maquiladora industry, 1973–95.[a]

		Textiles	Electronics	Transport Equipment	Others
1973	Enterprises	24	47	2	27
	Employment	13	68	2	17
	Gross production	10	66	4	20
1979	Enterprises	23	33	7	37
	Employment	16	60	5	19
	Gross production	11	63	4	22
1985	Enterprises	14	36	8	42
	Employment	10	48	19	23
	Gross production	7	47	28	18
1992	Enterprises	18	25	8	49
	Employment	11	35	25	29
	Gross production	5	43	30	22
1995	Enterprises	...	...	...	...
	Employment	15	36	22	27
	Gross production	4	48	22	26

[a]Total gross output=100.
Source: *INEGI* (1996a); Romero and Paredes (1993), obtained from Sander (1997).

These trends are confirmed looking at the U.S. 806/807 data, which shows the sectoral share of Mexican exports to the United States. In 1969, one fourth of all maquila exports to the United States was in toys and dolls, and textiles, and 50 percent was in electronics. Of this, televisions accounted for 17 percent and semi-conductors for 16 percent. In 1979, electronics expanded to 53 percent, but changed markedly, with televisions increasing to 25 percent and semi-conductors falling to 5 percent. In addition, textiles fell sharply, to 10 percent, and toys and dolls disappeared from the top ten. By 1987, electronics had fallen to 41 percent, and televisions to 10 percent. By this time motor vehicles represented 28 percent of the market.[8]

Clustering. There are also significant geographical differences in the sectoral distribution of maquilas. Tijuana is heavily concentrated in electronics, especially televisions. Ciudad Juarez is concentrated in the automotive sector. It calls itself "harness valley" because of the concentration of wire harness manufacturers.

This clustering is often very localized. For example, in Baja California Norte, the most important sectors are electronics (25 percent), apparel (13 percent), plastics (9 percent), and furniture (8 percent). In its most important city, Tijuana, these sectors are even more pronounced: electronics account for 28 percent, and plastic for 10 percent of the total. Chihuahua shares the two most important sectors, but electronics are a much larger percent of the total, over 40 percent, with apparel accounting for 13 percent. But what is interesting is that Juarez is very different from the rest of the state and from Tijuana. In Juarez, transport equipment accounts for 42 percent of the total number of maquilas. Apparel is second, with 12 percent, and electronics is only the tenth largest industry (2.2 percent), behind even wood and leather.[9] See table 7.

[8] Fatemi, pp. 24–26.
[9] *Solunet Twin Plant Guide,* 1998.

Table 7. Percentage of industry by type.

Industry	Baja Cal Norte	(Tijuana)	Chihuahua	(Juarez)
Electronics	25	28	41	2
Apparel	13	7	13	11
Plastics	9	10	3	…
Furniture	8	9	…	…
Fabricated metal	6	7	5	…
Misc. manufacturing	6	5	…	5
Machinery/Comp	5	4	2	5
Instruments	4	4	5	3
Wood	3	4	3	2
Earth/Glass	3	…	…	…
WS, durable	3	4	5	
WS, nondurable	…	…	…	6
Services	…	…	4	…
Transport equip.	…	…	4	42
Repair services	…	…	…	4
Leather	…	…	…	3

Source: *Solunet Twin Plant Guide,* 1998.

In the three representative interior states investigated—Zacatecas, Jalisco, and Durango—apparel is by far the most important industry. In Durango, for example, 87 percent of the maquilas are in the apparel industry; in Zacatecas, it is 43 percent; and in Jalisco, 25 percent. Electronics ranged from 29 percent of the total Zacatecas, to a low of one percent in Durango. This difference shows the movement of lower skilled industries from the border to the interior. Today, more than half of the textile maquilas are located in an interior state. The Yucatan Peninsula is an increasingly important area for this activity, because it is a short, direct flight across the Gulf of Mexico to Florida. Food processing is concentrated in Guanajuato.

The border states also house a much wider variety of industries than the interior states. In Chihuahua and Baja California Norte, over 30 types of industries are represented, by SIC classification. Less than half of that number is represented in the three interior states surveyed. Zacatecas had only six industries, for example.[10]

Ownership distribution

In 1995, 43 percent of maquilas were owned by Mexican companies; 38 percent were owned by U.S. companies; 14 percent were U.S./Mexican joint ventures; and 2 percent were Japanese owned. In the border region, however, the Mexican participation rate is much lower.[11] In both Chihuahua and Baja California Norte, about 70 percent of the maquilas are owned by United States companies, with about 18 percent being owned by Mexican firms. Again, there are regional differences. Asian firms are represented to a significantly larger extent in Baja California Norte (13 percent), compared to Chihuahua (7 percent). See table 8 for regional variation in ownership.

[3] Food, apparel, furniture, leather, earth/glass, and electronics.
[11] Naftaworks, 1998. The data following come from *Solunet Twin Plant Guide,* 1998.

There are also differences across sectors. For example, there are roughly the same number of domestic and foreign apparel maquiladoras in Tijuana (each about 4 percent of the total). However, in both Tijuana and Juarez, in the sectors requiring more technical skills, foreign maquilas far outnumber Mexican ones. In many sectors, Mexican firms are not represented at all, but of the top thirty sectors represented in these cities, none are without foreign representation.

The picture is different in the three interior states investigated. In many of the important sectors—e.g. construction, metal fabrics, earth/glass, and food and plastics—there is no foreign representation. However in the more technical sectors like electronics and machinery, there is always a stronger foreign presence. Foreign owned maquilas tend to be bigger as well—twice as large in Baja California Norte and five times as large in Chihuahua. Neither state has a Mexican owned maquila with more than 1000 employees.

Table 7. Regional variation in ownership.

Country of origin	Chihuahua	Baja Cal Norte
Asia	6.80%	13.00%
Canada	1.00%	0.00%
Europe	5.60%	1.00%
Mexico	18.80%	18.00%
United States	67.60%	68.00%

Source: *Solunet Twin Plant Guide*, 1998.

IV. The Investment Climate in Mexico

Manufacturing processes that can be separated, the existence of considerable factor price differentials, and the ongoing reduction of communication and transportation times and costs has enabled firms from industrialized countries to lower costs by conducting some of their manufacturing activities abroad. A firm from an industrialized country keeps at home those stages of production in which it has a comparative advantage (R&D, and technical and capital intensive work) and outsources the stages of production in which it does not (mostly labor intensive activities). It weighs the advantages of cheaper labor against the disadvantages of operating abroad: distance from markets and suppliers, less adequate infrastructure, cultural and language barriers, and increased risk, etc.

In general, firms consider the following broad factors: the price and quality of the labor force (and considerations like stability, the presence of unions, and the ability to fire workers); the infrastructure of the country (ports and roads, communications, and utilities); the distance from markets and suppliers; business uncertainty (due to government policy, and political or economic stability); the existence of similar industries; the legal and institutional framework (the regulatory environment, tax laws, etc.); and specific incentives offered by the government.

Developing countries try to accentuate their advantages and minimize their shortcomings. The above list demonstrates that there is tremendous scope for sound policy and intelligent public sector investment to create conditions that make a developing country attractive to foreign investors.

This section will examine the Mexican investment environment based on the following criteria: location, the labor market and the cost of labor, infrastructure, the regulatory environment, and the quality of industrial parks. This analysis rests in large part on the results of a survey of plant managers and other participants in the maquiladora program. A profile of survey participants begins the section.

Profile of firms surveyed

Twenty-one firms were surveyed in this study.[12] A detailed questionnaire asked about each firm's production structure and operating organization, its markets and suppliers, its location criteria and attitude toward the business climate in Mexico, and its labor practices. Additional interviews were conducted in an open form. The interviews were supplemented by plant visits in several cases.

In order to supplement our understanding of the sector, additional interviews were conducted with the Vice President of Bermudez Corporation, the oldest and largest developer of industrial parks in Mexico; the President of the Maquila Association of Juarez; the Vice President of the Tijuana Economic Development Council; the managing editor of *Twin Plant News*, the maquila industry magazine for doing business in Mexico*;* the president of a consulting firm that sets up maquilas; and the officer at Bancomex in charge of developing domestic suppliers to maquilas.

Although the sample size is too small to yield results of statistical validity, care was taken to represent the broadest cross-section of firms possible. A summary of the regional, ownership and sectoral distribution of the firms surveyed is as follows.

Seven firms were located in Tijuana, five firms in Ciudad Juarez, and four in Chihuahua. In addition, one firm was interviewed in each of the following cities: Mexicali, Sonora, El Salto, Rosarito, and Camargo. The average length of time that each firm had been in Mexico was twelve years, with the oldest dating back to 1970. All but three were located in an industrial park, and eleven different parks were represented.

The firms represented a cross-spectrum of industries,[13] with a range of technical sophistication. The following industries were represented in the sample: fabricated metals (3); chemicals (1); transportation equipment (2); electrical equipment and components (5); apparel (2); wholesale durable goods (1); measuring devices (2); stone, glass, and clay (3); industrial and commercial machinery, and computers (1); and miscellaneous repair (1). The average plant size was 640 employees, with the largest firm employing 5,500 people and the smallest employing 32 people.

Mexico's Competitive Advantage

Location. Mexico offers an enormous incentive to foreign investors and domestic exporters provided by no other developing country pursuing an export-led growth program: a two-thousand mile border with the United States. In our survey, all firms but two listed the United States as their most important market. Of those firms, the average market share of the U.S. was about 90 percent.

[12] Interviews were conducted primarily in person, but were supplemented by telephone interviews and mailed questionnaires.

[13] This is not an accurate representation of industry distribution for the entire Maquila sector in Mexico.

Of seventeen firms, sixteen said that proximity to the U.S. market was very important (13) or somewhat important (3) to their decision to locate in Mexico. In fact, only four of the firms considered alternate locations for their plants.[14]

It is not just the proximity of the two countries that is important, but the fact that they are contiguous. The ability to move merchandise by truck enables much greater delivery flexibility to customers and from suppliers in the United States, than does a shipping schedule, even from a heavily trafficked area (such as Puerto Rico). In 1997, 78 percent of the value of trans-border shipping from Mexico to the United States went by truck. A breakdown of the top U.S. destinations and products from Mexico by method of transportation is attached as Appendix 2. To supplement shipping information, three trucking firms were contacted as a part of this study. A schedule of shipment costs from the border to representative cities in Mexico, with shipping times, is attached as Appendix 3.

The convenience of the border location is not limited to the proximity to markets and suppliers. It is often more explicitly a decision to be near the parent firm. This is especially important when production processes are complicated or when the firm uses just-in-time manufacturing processes. A distinct advantage that Mexico offers over its Asian competitors is that U.S. managers can easily visit maquilas on the border to offer immediate technical or operational assistance, flying in and out on the same day if necessary.

In fact, the original concept of the *twin plant* was based on this idea. The original model was that a manufacturing operation would construct two twin plants that almost straddled the border opposite from one another. The plants would capture management efficiencies and economies of scale through their proximity, but would still be able to separate production processes according to factor prices. Although the maquila industry has thrived, the twin plant concept never took off. Transportation in the United States is efficient and inexpensive enough that there were no real advantages from moving headquarters from, say, Chicago, to the border.

In addition, because they are contiguous, U.S. managers can easily retain the option to live in the United States (in San Diego or El Paso, for example) and work in Mexico (in Tijuana or Juarez). Although commuting times can be significant due to customs border checks, many managers choose this option. Currently, about one thousand non-Mexican managers work in Juarez and live in the United States, for example.[15]

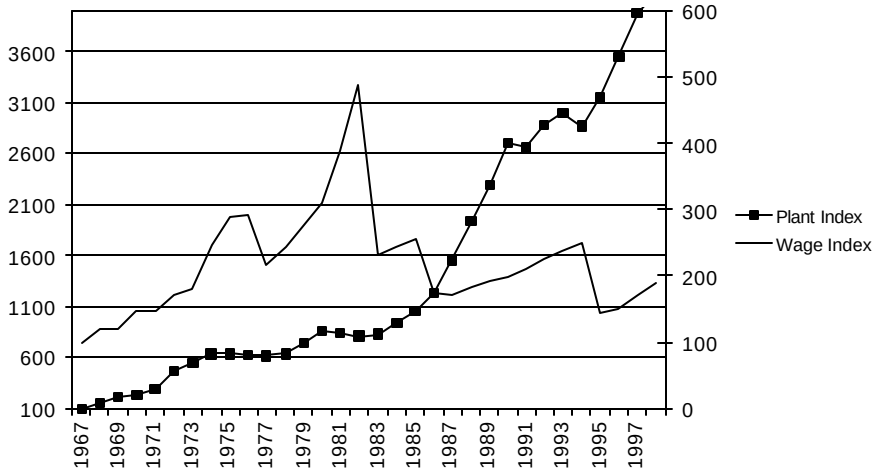
In part because of its location, maquilas have not been offered the special incentives—preferential access to capital, tax holidays, or subsidized utilities—to which they have grown accustomed in Asia, for example. For companies that place a strong emphasis on proximity to the United States, but that require additional incentives, Mexico's two strongest competitors are Puerto Rico and the Caribbean Basin countries, most notably the Dominican Republic. Wage rates are considerably higher in Puerto Rico, but the labor force is also more productive and the infrastructure is better. It offers several tax incentives.[16] Puerto Rico is then an alternative for higher end producers. Wage rates are lower in the Dominican Republic and the tax incentives are considerable, but the

[14] In several cases, plant managers interviewed were not employed at the company at the time that certain decisions were made. Responses were included if the interviewer seemed reasonably confident, but often answers to location decision questions were preceded with "to the best of my knowledge…."
[15] Bermudez promotional literature, 1998
[16] Companies operating in Mexico are subject to full Mexican taxes, while a company operating in Puerto Rico is taxed at only 60% of its manufacturing income, plus nominal Puerto Rican taxes.

infrastructure is poor, and very little electronics or technical assembly is done there. The D.R. is a competitor for lower end textile or apparel manufacturers.

The cost of labor and the labor market. The second critical advantage that Mexico offers United States employers is hourly wage rates that are significantly lower than those in the United States, although the history of dollar wage rates in Mexico is more a function of the exchange rate than of rises in the domestic wage rate. With the major devaluations of the peso in 1976, 1982+, and 1994–95, the price of Mexican labor was reduced dramatically for U.S. firms. Figure 1 charts the rise in the index of the number of maquilas in Mexico with the index of the dollar value of the minimum wage on the border from 1967 to 1998. A history of the minimum wage in Mexico is attached as Appendix 4.[17]

Figure 1. Trend of wages and number of plants.



Source: Minimum wage rates, *Twin Plant News,* 1998; number of plants, *SECOFI,* 1998.

During the late 1960s and early 1970s the peso was substantially overvalued, due to the discovery of oil reserves and high tariffs, etc. Figure 1 shows that during this time, the growth of the maquila sector stalled, due in part to the recession in the United States in the early 1970s. Then with the large devaluation of the peso in 1976 and the strong growth of the U.S. economy, maquila investment grew. By the early 1980s, the peso was again severely overvalued, and the dollar value of wage rates climbed to the highest levels in their history. For the first time, the maquila sector actually suffered a net loss of plants. Then, with the devaluation in 1982, combined with the new outward orientation of the government and the liberalization of the foreign investment law, the maquila sector began to grow at unprecedented rates. The devaluation of 1995 brought the growth rate to even higher levels.

Many factors in both countries contributed both to the peso's devaluation and to the growth in the number of maquilas—such as business cycles, NAFTA, and other legislative agreements. However, the strong correlation between wages and maquila growth is noteworthy.

[17] The federal government sets the minimum wage, which varies by region. The border regions and Mexico City have the highest minimum wages, although maquilas pay more than the minimum wage.

Of course, the relative wage rates between the United States and Mexico are not the only consideration. Firms compare wage rates across countries that are potential investment locations. For example, in 1982 the dollar value of Mexican wages was $1.69. This was only 15 percent of the U.S. wage, but it was 26 percent *higher* than Korean wages and 17 percent higher than wages in Taiwan. By 1989, after the series of devaluations beginning in 1982, the Mexican wage was $1.07. This was 8 percent of the U.S. wage and 24 percent *lower* than wages in Korea and 37 percent lower than wages in Taiwan.[18] Mexican wages have stayed competitive since that time. In 1996, the average Mexican wage was $1.33, compared to $4.83 in Taiwan and $5.14 in Korea.[19]

Truett and Truett investigate the impact of relative wages on Mexican output in their 1993 paper, "Maquiladora Response to U.S. and Asian Relative Wage Rate Changes."[20] Using annual data from 1974–88, They estimate maquiladora output as a function of: the Mexican/U.S. relative wage rate, the Mexican/Singapore relative wage rate,[21] the Mexican/U.S. relative price of producer goods, and the level of aggregate demand in the United States. They estimate this equation for all maquila plants, those on the border, and for specific industries (clothing and footwear, electronics, and motor vehicle and machinery).

They find that Mexico/Pacific rim relative wages affect maquila output. The coefficient on this variable is negative in all scenarios, and is significantly different from zero at the five percent level of significance, both at the aggregate level, and for the motor vehicles sector. They conclude that production in Mexico and production in the Pacific rim are substitutes.

Additional compensation. The legal work week in Mexico is 48 hours, with Sunday a fully paid holiday. Maquilas will typically offer five nine-hour work days, so that workers end up working for 45 hours and getting paid for 56 hours. Overtime is paid double or triple, depending on the circumstances.

There is no unemployment insurance in Mexico, but if an individual is let go for any reason, he or she receives ninety days' pay, plus accrued vacation and seniority premiums. In addition, companies are required to pay a fifteen-day Christmas bonus each year and one week's vacation pay after a year of employment (plus a 25 percent premium). Two days are added each year until the employee receives two weeks of paid vacation. Social security contributions are also mandatory, and cover things like retirement benefits, accident coverage, and twelve weeks of maternity leave. In addition, companies pay a housing tax that goes to a federal housing fund.

In our survey, no plant managers thought that the cost of labor was prohibitive. Three complained that it was difficult to fire workers, but most did not find that complying with labor legislation was onerous.[22] On the other hand, several firms felt that the social security was not adequate in Mexico and that they were contributing to an inefficient system. Housing is also a tremendous problem on the border, and several managers complained about the fact that the housing fund was administered at the national level, so that housing assistance for the border regions did not match the contributions to the fund made by the maquila sector. They suggest that the housing fund be administered regionally.

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[18] Fatemi, p. 22.
[19] SEDECO, obtained from Tijuana development literature.
[20] Contemporary Policy Issues, 1993.
[21] Singapore has the lowest wage rate of the four tigers.
[22] One manager remarked that an additional advantage was that in Mexico companies are allowed to advertise for exactly the kind of worker they want—a twenty-three year old female, for example.

A full accounting framework incorporating all costs associated with hiring an employee in Mexico is attached as appendix 5. According to this estimate, fringe benefits and direct and indirect tax payments are a full 79 percent of direct payments to the employee, and an entry level, unskilled worker should cost a firm 70.84 pesos per day. At an exchange rate of 8.2 pesos to the dollar, this is a daily cost of $8.63 dollars. However, in our survey, total daily compensation paid to workers was reported to be significantly higher.[23] For unskilled workers, survey respondents paid an average rate of 240 pesos per day ($29.26). For skilled workers, the average daily rate was 458 pesos ($55.85). There was considerable variation among companies for both categories, however.

The labor market

In our survey, firms were asked to rank, on a scale of zero to five, the conditions that they felt hindered their effective operations in Mexico. A rank of zero indicated that the factor did not in any way interfere with their operations, while a rank of five meant that it was a large problem for them. In 1995, the Flagstaff Institute undertook a similar study, surveying a sample of firms Juarez. The studies are slightly different: slightly different factors were included, and in the Flagstaff system, a low number meant a bigger problem. In addition, the Flagstaff study asked firms to rank the problems *relative to each other* only. Thus our scale also implies some kind of absolute rating of the problem. However, the ranking is more useful than the absolute numbers.[24] The results of both studies are presented in table 9.

Table 9. Degree to which selected issues interfere with plant operations.[a]

HIID ranking	
Difficulty finding skilled workers	3.33
Transportation/housing of workers	2.57
Government regulations	2.35
Employee turnover	2.20
Utilities	2.18
Political or economic instability	2.13
Absenteeism	1.93
Supplier delays	1.93
Indirect costs	1.82
Customs procedures	1.77
Telecommunications	1.64
Difficulty finding unskilled workers	1.57
Transportation of goods	1.30
Labor organization/unions	0.97

Flagstaff ranking	
Employee turnover	1.5
Absenteeism	2.88
Labor transport	4.08
Telephone communication	4.46
Electric supply	5.83
Mexican Customs	6.17
Data (computer communications)	6.33
Goods transport	7.25
U.S. Customs	7.63
Border crossing	8.87

[a] Both tables rank problems from most difficult to least difficult.
Source: Flagstaff ranking from Flagstaff Institute, 1984.

[23] Thirteen respondents answered this question. It is unclear in some cases whether respondents included full compensation or simply the direct money paid to employees. In addition, the question asked for the salary of the average worker, not an entry-level worker.
[24] Throughout the interview process, we found a large variation in attitude toward Mexico in general. Some were exasperated by problems, while others simply shrugged them off as the cost of doing business in this country. This difference in attitude can skew survey results.

The Maquila Program was first introduced as a regional development program to alleviate the unemployment on the border resulting from the termination of the *bracero* program with the United States. Today, the tight labor market on the border is one of the biggest problems facing maquilas in cities such as Juarez and Tijuana.

In both studies, concerns about the labor market—obtaining and retaining workers—was considered the most important problem. This is manifested on several dimensions: high employee turnover rates, high rates of absenteeism, the use of incentive programs to retain workers, upward pressure on wage rates, and increased expenditures on advertising and/or recruiting, etc.

Labor turnover, in particular, is a result of the number of maquilas operating in the region. In both Tijuana and Juarez, for example, there were signs outside of every maquila advertising for workers. As one manager in Tijuana explained "with so many maquilas, if your second cousin has a wedding, you just quit your job, go to the wedding, and return a couple of days later to start work at essentially the same job at the maquila next door." NAFTA Ventures, a consulting company that locates American firms in Mexico, said that it had not placed a maquila on the border in five years, because the labor market is so tight. They argue that transportation costs are negligible compared to the indirect cost associated with labor turnover rates of fifty percent per year on the border.

Clearly, the costs are significant. In its 1985 survey, the Flagstaff Institute found that the single most important factor to "attractive" business operations was a stable work force, finding it more important than low wages and the easy ability to adjust the size of the labor force.

The firms in our survey had an average turnover rate of seven percent per month. Of the fifteen that answered the question, six considered labor turnover to be a big problem, and eight considered it somewhat of a problem. The firms had an average rate of absenteeism of 4.5 percent. However, about one third of the respondents felt that the problem of labor turnover drops off precipitously after the first few months of employment, and that the problem of absenteeism improves as well. As a result, most employers implemented some kind of incentive scheme to reduce absenteeism and encourage worker retention. This mainly took the form of an attendance or punctuality bonus. Some of these incentives included the following.

- A six percent pay increase for showing up every day of the week
- A bonus for being on time 30 days in a row
- Benefits that start after six months
- Subsidized or free transportation
- A subsidized lunch program

However, the more difficult problem from the point of view of the firms that we surveyed was that of finding qualified employees, especially technical or skilled employees. While only four firms (of seventeen responses) found it difficult to find qualified people for unskilled positions, eleven (of nineteen responses) found it somewhat (5) or very (6) difficult to find workers to fill skilled positions.

Labor organization ranked as the least important problem for the firms that we surveyed. Unions are not common on the border, and only six of the firms in our survey had unions. However, the threat of labor organization and unions is a factor in firms' location decisions. Of the fifteen firms responding, nine said that the absence of a union it was an important (6) or crucial (3) factor in their decision to locate in Mexico.

Government regulations

Regulations affect the maquila sector both to the degree that it is difficult to set up a maquila and begin operations, and to the degree that it is difficult to do business on an ongoing basis.

Setting up a maquila. A summary of the steps and procedures required to establish a maquila is attached as appendix 6. Two lessons from the Mexican experience are worth noting. First, as Sklair emphasizes, the 1983 decision to place the maquila sector under the responsibility of one administration, SECOFI, greatly improved the Maquila Program, both in terms of its simplicity and its transparency.

Second, an interesting phenomenon has occurred in Mexico—the privatization of the startup process. "Shelter operators" abound in Mexico. They are consultants that offer to attend to all administrative and legal issues involved in setting up a maquiladora plant. They take care of logistics such as finding a location, setting up a factory to specifications, hiring workers, and handling all communication with government officials to ensure compliance with regulations. In this way, these companies "shelter" the investor from Mexico, and allow him to concentrate entirely on the manufacturing process. The fees (usually charged as a percent of the total labor hours at the plant for a fixed period of time) can be expensive, but the arrangement allows for a much faster startup time. It is a temporary arrangement, designed to terminate when operations are running and the owner has learned how to do business in Mexico. There are countless shelter operations in Mexico, although only two of the firms we surveyed used a shelter operation.

Regulations affecting business operations. Complying with governmental regulations can be time consuming, although not necessarily difficult. Our survey respondents felt that Mexican regulations were many (10) or average (8). Of those, seven felt that they were difficult to comply with. Most felt that they were easy or getting easier. The regulations most often mentioned as burdensome were paperwork requirements and customs regulations.[25]

In Mexico, copies of documents must be kept for up to ten years. Three managers felt that storage requirements of documentation alone was extremely costly. Even after documents are given to officials, "they are often lost" so that companies are expected to have non-essential copies on hand, even after they are submitted.

Customs requirements as specified in the legislation, were not seen as particularly onerous. However, three problems were mentioned more than once. First, customs officials interpret rules differently, so that a changing of the guard at the customs bureau can result in delays or in the discovery that things that were once within compliance are no longer so. Second, rules change without enough warning. Third, small mistakes can be very costly. A truck can get sent back for a missing signature, for example. "A major problem" one manager commented "is that there is nobody at the border who can make decisions. So if you make a simple mistake like reversing the truck numbers of the two trucks that are going across together, they both get sent back. The man knows it's a simple mistake, but cannot let it pass."

Generally, respondents felt that regulations were getting better and that their administration was becoming more efficient and more transparent. Some also felt that their status as part of the maquila sector was beneficial. Because the government, especially at the city level, is eager to

[25] Environmental regulations and the labor law were also mentioned.

encourage this sector, things are not held up as they might be. This was confirmed in interviews with officials in both Juarez and Tijuana.

Infrastructure

Housing and transportation. The rapid growth of the border cities resulting from the opportunities presented by the maquila sector and increased trade with the United States in general has put tremendous pressure on the infrastructure of the border cities. Tijuana's population growth is about 7 percent per year, for example, but the city's infrastructure has not been able to keep pace with it.

The most pressing problems have been a lack of city planning and a severe shortage of acceptable housing for workers. Transportation and housing of workers was ranked as the second biggest problem interfering with successful business operations by the firms that we surveyed. Housing construction has been hampered by high interest rates, however.

Transportation infrastructure at the border is also under enormous strain, a problem that has grown more pressing since the passage of NAFTA. It can take anywhere from one to three days to get a truckload of goods across the border, for example.[26] Truck lines of up to five miles long are not uncommon in Tijuana. Managers living in the United States and working in Mexico reported nightly commutes in excess of one hour, just to cross the border.

Communications and utilities. Twelve out of fifteen managers in our survey rated communications as satisfactory or better. Improvement has been noticeable since the telephone monopoly Telmex began to privatize in 1996. Before 1996, it was not uncommon for major companies to install their own communications systems.

Eight out of sixteen managers found that utilities were not satisfactory for their operations, however. Managers complained about the quality of the water and power outages and surges. In addition, half of the managers that did rank utilities satisfactorily felt that they were too expensive.

The logistics of setting up utilities is a separate problem.[27] *Twin Plant News* is the maquila industry magazine for doing business in Mexico, and is a good barometer of the problems that maquilas face.[28] In its 1995 year-end guide it highlights some of the requirements for getting utilities set up, from which the following is a summary.

> First, the Federal Electricity Commission (which holds a monopoly on generating and distributing electricity throughout the country) requires that the plant pay for the infrastructure to supply the electricity to its facility. CFE provides service only to the primary voltage; the owner must install (and maintain to CFE standards) the substation equipment that it requires. Furthermore, CFE requires a letter of feasibility stating that it has the capacity to service the electricity requirements of the plant. If the owner does not request this letter, CFE can later claim that it does not have the capacity, and then

[26] Currently, Mexican and United States trucks are only allowed to operate in their respective countries. A U.S truck will take a load of goods to Laredo, for example, where it will clear customs. It then moves across the border on a drayage. A Mexican trucking line then takes it to its destination in Mexico.
[27] One respondent claimed that it took him one month to get a telephone line and 20 days to get electricity. This was later confirmed as not atypical.
[28] There are regular columns on the Mexican tax law, Nafta, U.S. Customs regulations, etc.

require the owner to pay higher infrastructure costs. Companies take responsibility for their own water systems, but the Water Board will charge a fee for water service that usually run in the tens of thousands of dollars. Water pressure varies enormously throughout Mexico, so that in many cases facilities are designed with their own water tanks. A plant may also have to install separate sewer systems for domestic use and industrial use. The article ends with a warning that knowing somebody will be very useful for getting these kinds of things thing set up.

Industrial parks in Mexico

The Maquila Program is a bonded warehouse program, and maquilas are not restricted to setting up operations in specific geographical areas, but most maquilas choose to locate in industrial parks of some kind. These are not export processing zones, established as fenced-in "enclaves" separate from the domestic economy, however. Rather they are parks, privately or publicly operated, that offer a varying degree of services, depending on rental cost.

The additional administrative and other assistance offered by EPZs in Asia, such as customs administration and centralized problem solving, are not usually offered by these parks. They are barely distinct from the cities in which they are located. For example, in Bermudez park, the oldest and largest in Mexico, the Bermudez corporation bought the land, installed roads, water and electricity, and sold the first lot (to RCA). But when the park began to fill up, Bermudez turned it over to the city. The city then became responsible for utilities and infrastructure. However, parks in different price ranges will offer different services. Of the thirty-seven industrial parks in Tijuana, for example, five provide daycare facilities; nine provide sports facilities, twenty-eight provide private security, and twelve have tenant associations.[29]

The Border Industrialization Program was well underway before the first industrial park was established in Ciudad Juarez. By 1995, there were ninety industrial parks in this region, which was where eighty percent of maquilas were located.[30]

Important considerations for selecting an industrial park are size; price; infrastructure; location within the park; communication and utility capacity; the proximity of the park to worker housing; proximity to local transportation systems (for workers); access to the highway system and border crossings; and additional benefits and services offered.

All firms interviewed took care of their own customs, etc., and most responded that their parks offered nothing in the way of support services. They listed several advantages to their parks, including the following responses:

- It has better infrastructure (especially wider roads for trucks in park areas).
- It is easier for transportation of employees because buses stop there.
- There is a maquila association.
- It is cleaner and better landscaped than the rest of the city.
- The building was already constructed, but we could still design the interior using our specifications.

According to the respondents surveyed, the major (and significant) disadvantages to locating in a park were labor related. First, parks are typically far from the *colonias* where workers live and

[29] Informative materials published by the Tijuana Economic Development Corporation.
[30] Sanders, 1997.

transportation is a problem, especially given that the average Mexican worker returns home for lunch. This was a common complaint from the managers we interviewed. In Juarez it was standard for companies to organize bussing for their workers (although this was not a common practice in Tijuana). Several managers said that if they had to do it again, they would relocate closer to where workers lived. One park in Tijuana was located close to a large colonia, and both managers interviewed there said that although it was less convenient for customs (trucks had to go through downtown Tijuana), it was worth it to be located closer to the labor force. In a related problem, there is intense competition for labor within parks. Because the maquilas in parks are so close together, it is easy for workers to move from one maquila to another. Last, wage rates were said to be higher in parks than elsewhere.

When asked the most important way that parks could be improved, respondents suggested the following.

- Services for laborers should be available, such as cafeterias or transportation to the park.
- Assistance should be offered in finding workers.
- There should be better preventive road maintenance.
- There should be better water and electricity.

Respondents were largely indifferent between operating in a public or privately managed park, but in both Juarez and Tijuana we interviewed one owner who moved from a larger, established park, to a newer, smaller one. Both moved because the smaller park was cleaner, less congested, and there was less intense competition for labor.

V. The Economic Impact of Maquiladoras

This section evaluates the economic impact of the maquila sector on Mexican development. Its impact is evaluated on three criteria: as a source of foreign exchange earnings, as a source of employment and skill upgrading/knowledge transfer, and on its backward linkages with the rest of the economy. These areas are interrelated and often mutually dependent. For example, knowledge and technology transfer will depend on large part on the establishment of backward linkages.

The maquila sector as a source of foreign exchange

The maquila industry is now the second most important export industry, after oil extraction (and ahead of tourism). Table 10 lists the exports, manufactured exports, and maquila exports in the 1990s.[31] It shows that the maquila industry has consistently accounted for approximately 50 percent of manufactured exports and 40 percent of total exports.

[31] Before 1991, maquila exports were considered in the service accounts of the Mexican national accounts.

Table 10. Total, manufactured, and maquila exports, 1990–97.
(Millions of U.S. dollars)

Year	Total Exports	Manufactured Exports	Maquila Exports	Maquila Exports, % of Total	Maquila Exports, % of Manuf Exports
1991	42687.7	32307.2	15883.1	37.21%	49.16%
1992	46195.6	36168.8	18680.1	40.44%	51.65%
1993	51886	42500	21853	42.12%	51.42%
1994	60882.2	51075.1	26269.2	43.15%	51.43%
1995	79541.5	67383	31103.3	39.10%	46.16%
1996	95999.7	81013.8	36920.3	38.46%	45.57%
1997	110431	95564.5	45165.6	40.90%	47.26%

Source: *Cuaderno de Informacion Oportuna,* May 1998, published by INEGI.

In addition, throughout its history, the maquiladora industry has consistently run a trade surplus, and has thus been a positive source of foreign exchange earnings for Mexico. Furthermore, the dollar value of value added has continued to grow, despite exchange rate devaluations. By 1991, the sector accounted for fifteen percent of total foreign exchange earnings for Mexico.[32] By 1998, total value added reached almost nine hundred million dollars.

However, most of the value added in Mexico is in the form of wages. In 1996, wages and benefits accounted for 49 percent of value added; machinery, equipment, and real estate accounted for 30 percent, and raw materials and packing accounted for 7 percent. This raises a question about the retention of foreign exchange earnings. Because the majority of maquiladoras are located near the border, it is easy for workers to spend their salaries in the United States. Peso devaluations will discourage this practice, but trade liberalization will encourage it. The proper measure of retained foreign exchange earnings should be determined after taking into account these expenditures by Mexican laborers on U.S. goods and services. In 1987, Grunwald estimated that the earnings retention on the border probably ranged between forty and sixty percent.

The impact on employment and labor force upgrading

Clearly, the maquiladora sector has been an important source of employment. By the beginning of 1996, there were 710,000 workers in the maquila sector, 82 percent of whom were laborers, 11 percent of whom were technicians and 7 percent of whom were administrators. This accounted for almost 23 percent of total manufacturing employment (up from 5 percent in 1980).[33] By 1998, there were over a million workers employed in this sector.

This source of employment has been also important as a counter-cyclical shock absorber. It is the sector that primarily benefits from the exchange rate depreciations that have plagued the Mexican economy for the last two and a half decades. It was the only sector that grew during 1995 (providing about 80,000 new jobs), for example.[34]

[32] Grunwald, 1991.
[33] Sander, 1997.
[34] Naftaworks.

The maquiladora sector is somewhat unique in the world of offshore assembly operations, because it is not a sector that exclusively employees women. As the maquiladora sector has developed over the years, and grown to include industries that are more technological, the percentage of women as a part of the maquila workforce has decreased significantly, from almost eighty percent to about sixty percent.

Table 11. Maquila employment by gender, 1975–93.

Year	Total	Men	Women	% Female
1975	57850	12575	45275	78.3%
1981	110684	24993	85691	77.4%
1983	125278	32004	93274	74.5%
1985	173874	53832	120042	69.0%
1987	248638	84535	164103	66.0%
1989	349602	135081	214521	61.4%
1991	375558	148679	226879	60.4%
1993	439691	177996	261725	59.5%

Source: Economic Commission for Latin America and the Caribbean.

The maquila sector is highly concentrated in electrical machinery and transport and other machinery. These sectors tend to employ more (and appeal to) male workers. It is not considered "women's work" in the way that apparel or textile manufacturing is. For this reason, the maquila sector has done more to reduce the employment rate, (as opposed to increasing the participation rate).

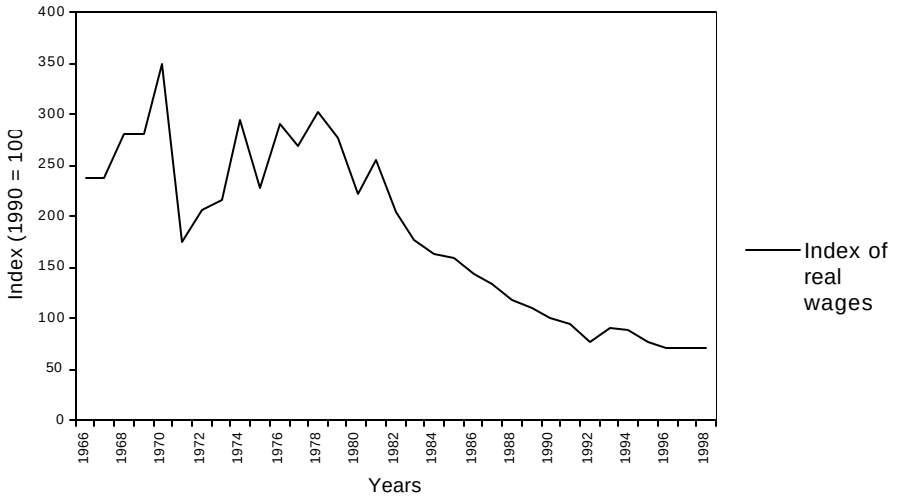
Real wages. On the other hand, real minimum wages in the maquila sector have continued to decline throughout the history of the program. Figure 2 shows the decline in the real minimum wage in the maquila sector, from 1966–97.[35]

However, typically maquilas pay wages in excess of the minimum required by the government. With the increasingly tight labor market on the border, it is also reasonable to assume that the actual average wages paid by maquilas in many instances have increased more rapidly than the overall rate of inflation. To the extent that this has been true, real wages have actually risen.

Training and knowledge transfer. An accounting of the training programs at maquiladoras is beyond the scope of this paper, but a majority of the firms we surveyed had some kind of training program. Some were quite extensive. Both plant managers and officials reported that the maquila sector has been actively working with universities—in particular engineering departments—to help design suitable curricula for the needs of maquiladoras. However, in Mexico, qualified managers and technical people often move from one maquila to another, as opposed to starting their own businesses as is often the case in Asia. This impedes knowledge transfer.

[35] *Twin Plant News*, January 1999.

Figure 2. Index of real minimum wages.



Grunwald (1991) argues that government policy regarding domestic sales is one of the most important reasons for the failure of knowledge transfer to take place. He argues that the most important learning takes place in domestic firms—on subcontracts or as part of joint ventures—that produce both for the maquila sector and for the domestic industry under one roof. This has not happened because domestic firms faced duties on intermediate inputs and (until 1989) sales taxes to supply maquiladoras. These taxes could be avoided by becoming a maquiladora, but would have meant losing the ability to sell freely in the domestic market.

Backward linkages

Developing backward linkages to domestic suppliers of intermediate inputs is an important dynamic goal for pursuing foreign direct investment. It increases the job multiplier from a given investment, and it improves the competitiveness of local firms by forcing them to meet rigorous quality, cost, and reliability standards. They also learn new technology and business/marketing techniques, often through the direct training that takes place as firms "develop" their suppliers.

Unfortunately, the local content of domestic intermediate inputs of the maquiladora sector in Mexico has never reached more than two percent of total costs, and in many cases consists mainly of inputs unrelated to the production process, such as office supplies, packaging materials, and cleaning supplies, for example. Part of the explanation surely comes from the very justification for setting up subsidiary operations, the ability of the production process to be separated that allows inputs from the parent firm to be assembled in the low wage country. However, Mexico's experience is in marked contrast to that of the Asian *tigers*, that have been much more successful in supplying multinational investors with locally produced intermediate goods.

In our survey, for example, nineteen firms listed the United States as their most important supplier. Of these, twelve claimed that they received all or almost all of their intermediate inputs from the United States. Nine of the firms used domestic suppliers solely for packaging and supplies. Of the firms that did use Mexican suppliers for at least five percent of their total

supplies,[36] the two Mexican firms had an average domestic content of 72 percent and the foreign owned firms had an average domestic content of 29 percent. These inputs were described as either "unprocessed raw materials" (3); "raw materials that had been altered or improved in some way" (6); or "manufactured goods" (3).

Clearly, a part of the reason is simply that domestic producers have not been able to compete on quality, reliability, or cost measures, compared with foreign suppliers.[37] However, in their 1994 paper entitled "Generating and Sustaining Backward Linkages Between Maquiladoras and Local Suppliers in Northern Mexico," Brannon, et al correctly point out that this explanation fails to address the real question, which asks why cost-cutting and quality-improving innovations have not taken place.

First, the legislation of the maquiladora program has directly discouraged the development of backward linkages. In the beginning, maquiladora operations were limited to a twenty kilometer strip on the border, far from the centers of domestic industry. In addition, maquilas have been restricted in their ability to sell to the domestic market. This lack of forward linkages deprives domestic producers of higher quality, cheaper intermediate goods that the maquila sector potentially could have supplied.

Second, there has been a lack of interest on the part of domestic suppliers, due to their protected domestic status, or due to their size. High profit margins and lower quality standards arguably make the domestic market more attractive than the maquilas for protected industries. In addition, to the extent that the maquila industry is considered "footloose," domestic suppliers will view supplying it as risky.

The volume required by the maquilas may also be too large for domestic suppliers to handle. Again, this is in large part itself a function of policy. In Mexico it is difficult to obtain the financing necessary to expand operations or upgrade capital. Domestic rates are prohibitively high, due to the government's macroeconomic and exchange rate policies. Furthermore, the failure of Mexican law to adequately prioritize security interests in property that could be used as collateral means that it is also difficult to secure U.S loans.[38]

A third reason lies in the procurement policy of the firm. First, as suggested, firms might vertically integrate strictly as a matter of policy. This is a significant distinction in the case of Mexico, because the United States is both home to the headquarters of a large percent of maquilas in Mexico, and a strong competitor for manufacturing inputs. Firms that purchase from the U.S. might be responding to higher quality/lower costs from competitors close by, or they might simply be sourcing from their parent firms. This was not the case in our study, however. Of the eleven U.S. owned firms responding, nine procured less than 50% of their inputs from the parent firm, six of which procured nothing.

Often, maquilas do not have a person in Mexico that is able to approve the use of local suppliers. Corporate headquarters will have less knowledge about local markets and Mexican suppliers will

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[36] Managers often estimated these percentages. The numbers could be end up looking different.

[37] However, in our survey, domestic suppliers were in many cases competitive with their foreign counterparts. Two-thirds of the respondents found reliability to be the same or better; slightly more than two thirds found the quality the same or better; and slightly more than half found the cost to be the same or lower.

[38] Mexican law will prevail even after the NAFTA.

have less access to corporate sourcing decision making. In a their 1989 study, Brannon et al surveyed 69 plant managers about their use of local suppliers, and found that those plants at which managers had procurement authority sourced a significantly greater amount of their inputs locally. They conclude that this is one of the most important reasons for a given plant's failure to source locally. In our survey, however, twelve out of fourteen firms had purchasing agents who could approve the use of local suppliers. There was no real difference in the amount of inputs sourced.

In any case, what is clear is that few maquilas locate in Mexico specifically for the presence of local suppliers. In our survey, for example, ten out of fifteen said that the presence of local suppliers was not at all important to their location decisions. The two firms that considered it very important relied on natural resource inputs.

What is more encouraging is that fifteen out of seventeen that answered said that they would consider it good for their business if they could source more intermediate goods locally. The following advantages were suggested.

- The logistics would be easier.
- There would be no exchange rate risk.
- It would allow for a quicker response time.
- It would allow inventory reduction/ quicker inventory turnarounds.
- It would lessen delivery time.
- Cost would be lower.

In addition, ten out of fourteen respondents were willing to offer technical and/or financial assistance to develop a local supplier. One already had. Those interested in increasing the local content were ask why they did not currently. The following reasons were cited.

- We cannot get quality certification 9001 if our suppliers are not also certified.
- They do not exist, or are not interested, or have not received any offers.
- They cannot compete on quality or price.
- It is not our corporate purchasing strategy.
- We have no time to find or develop local suppliers.

The impact of NAFTA

NAFTA provisions will be extremely helpful to the domestic industry in Mexico, especially when the rules of origin legislation come into effect. Currently inputs can be imported into Mexico regardless of their origin, but in 2001 each product will have to be wholly obtained or produced entirely in the territory of one or more of the parties. If not, it must (a) undergo a substantial transformation of the materials so that it becomes a new tariff classification, or (b) fulfill the requirement of regional content value (at least 50 percent of net cost).

Maquilas must then find North American suppliers, or they must convince their local suppliers to move to Mexico. In the short term, foreign maquilas from Asia and Europe will find it necessary to encourage their current suppliers to relocate to Mexico. An interview with Ford in *Twin Plant News* (March, 1998) highlights the problem, saying "It takes three to five years to establish a new supplier. It almost has to happen with the design of the product. Suppliers involved in the design phase usually have an advantage." For that reason, Ford thinks that the best way to source locally is to have existing suppliers move to Mexico.

However, existing suppliers will face the same restrictions. Eventually, intermediate inputs will have to come from a NAFTA country or will be subject to duties. The further back this process extends, the more competitive Mexican suppliers are likely to become.

VI. Policy Recommendations

The Maquila Program in Mexico has been successful in generating employment and expanding and diversifying Mexico's export base. Its location and low wage rates have been important to its success, but government policy has also been important. Arguably, the best thing that the government has done for the maquila sector over the course of the past two decades has been to leave it alone. From the beginning it registered maquilas as Mexican corporations, without ownership or restrictions or domestic content or employment obligations.

Furthermore, the fact that its development took place in the context of a wider program of liberalization and reform of the Mexican economy was also critical. Important strides have been made in the liberalization of the program (the removal of location and local market restrictions), the improvement of infrastructure (and the privatization of ports, communications, and railroads), and in customs and other administration. Exchange rate devaluations and Mexico's sequence of trade agreements helped the maquila sector grow enormously. Without these kinds of policies, it is unlikely that it would have successfully competed against other low wage regions in the world.

In addition, where the Maquila Program has not achieved its goals is arguably due in large part to the shortcomings in Mexico's liberalization program—for example, in the establishment of backward linkages. Because it has been protected by high tariffs, domestic industry has not had to compete globally and has not been able to develop competitively.

In any event, of the twenty one firms surveyed in this study, eighteen planned to expand their operations in Mexico, and all eighteen planned to expand in their original location. Reasons given included the following:

- I have grown to like it here. We have a good team now.
- The infrastructure has improved enormously.
- We plan to expand to the Mexican market next.
- NAFTA is in place.
- The labor is cheap and the quality is improving.

On the other hand, we then asked if their expansion to date had been an increase in volume, an increase in product variety, or an increase in vertical integration. Three had expanded only in terms of volume, eight expanded both the volume and the variety of their products, but only three had increased their vertical integration. Future plans fell largely along the same lines.

Mexico must move beyond its current successes to encourage these kind of firms to undertake more of their production activities in Mexico. Increasing value added should not come through price increases—through higher wages or an overvalued exchange rate. Nor should it come simply through increased volume. It should come instead through an increase in labor productivity and an increase in the vertical integration of the manufacturing process so that more stages take place in Mexico. This will mean, in part, targeting modern and higher technology, flexible production companies specifically, rather than traditional assembly line operations.

The modernization of an industry is characterized by a movement from low-skill, low-wage assembly operations to manufacturing operations; from Fordist large scale production to flexible small batch production; from just-in-case operating methods to just-in-time operations; and from being primarily a cost center to operating as a profit center.

Arguably this graduation and modernization of production *processes* is more desirable for a host country, from the point of view of both competitiveness and learning, than a graduation in production *activities*. Mexico has had notable success attracting higher technology industries, and although these types of industries will be more conducive to more mature structures, they are not necessarily the same thing. Routine, assembly operations are essentially the same activity, regardless of whether it is electronics or textiles.

Attracting flexible production industries offers many advantages to developing countries. First, these techniques reduce operating costs and increase efficiency, and firms will want to locate in a country where it is possible to use them. The presence of these firms will assist in this kind of knowledge transfer to domestic industry. Second, at the plant level, these structures place greater emphasis on increasing the training and skill levels of workers. Third, the increased use of subcontracting that comes from just-in-time manufacturing techniques better promotes backward linkages. Finally, this kind of production is well suited to the challenges that developing countries face. Post-Fordist techniques enable a lower scale of production and less investment in fixed capital and stocks, for example.[39]

But these kinds of operations will require certain conditions in a host country, like an infrastructure that makes delivery to market and from suppliers reliable enough to use a just-in-time schedule; a workforce that is trainable and that can multi-task; the existence of a technical and managerial labor pool; a regulatory environment that encourages competitiveness; and the existence of reliable suppliers to participate in the high degree of subcontracting that is one of the characteristics of this kind of operating system.[40]

The Mexican Government needs to needs to target effort and expenditure towards activities that support the development of this kind of environment, most importantly in the areas of education and training programs and infrastructure improvements. It should also encourage the migration of new maquilas to the interior of the country.

Education and training

The number one hindrance to effective operations in the firms that we surveyed was their inability to find qualified technical workers. Clearly, Mexico is not going to be able to continue to target high tech, high skill industry without qualified personnel. Training programs should be strengthened and university linkages to the maquila sector should be further encouraged.

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[39] This last observation comes from Carillo, 1995.

[40] In a 1989 survey of seventy-one maquila plants, Wilson investigated whether maquilas used Fordist or flexible manufacturing techniques, to determine whether production in low-wage countries was compatible with the latter. Her results led her to believe that they were not incompatible, and that eighteen percent of the maquilas she surveyed were at least a kind of "caricature" of the post-Fordist firm, failing on some important dimensions, such as undertaking R&D and using sub-contractors, but qualifying on others. (Wilson, *The New Maquiladoras: Flexible Production in Low Wage Regions*, 1990.)

Training programs specifically targeted to local suppliers also need to be extended and developed. Currently, the government does offer training to large exporters, but it is smaller operations that arguably need it the most. Training in bookkeeping and cost and inventory control and specific techniques should be accompanied by programs to promote local industry as a supplier to the maquila sector. This programs will include promotional programs, assistance with financing, and organizing groups to share ideas and improve communications.

Infrastructure

Probably, no single policy will do more to improve worker productivity than to improve transportation and housing for workers. The rate of growth of the border cities has put tremendous strains on the infrastructure of these cities, and the problems of labor turnover, and, in particular, of absenteeism, are directly related to workers' ability to get to work easily and to have decent living conditions at home.

Furthermore, infrastructure concerns will be critical to firms using just-in-time manufacturing techniques. Border delays and uncertainty from traffic congestion and unreliable rail service will make just-in-time manufacturing riskier. To attract flexible producers, Mexico will have to continue to make improvements in traffic management and border/customs management.[41] Moreover, infrastructure in the interior will have to be improved before local suppliers can effectively compete with their U.S. firms on reliability and cost.

Encouraging maquila development in the interior

Locating in the interior offers advantages to the maquila. Real estate costs less, wage rates are lower, the prices of other goods are lower, and what is probably most important, there is much less competition for labor. As a result, turnover and absenteeism rates are substantially lower.

Maquiladoras that are located in the interior of Mexico have a greater economic impact, for several reasons. They use considerably more local content in their production processes;[42] the leakage of foreign exchange from wages is diminished; and a maquila can be the largest employer in a smaller village and therefore can be a tremendous stimulus to the local economy. These advantages, combined with infrastructure strains on the border, argue for a sustained effort to encourage the migration of maquilas to the interior.

Areas for further research

Our survey attempted to determine to what extent firms were engaged in the kind of activities that show this kind of graduation from traditional assembly operations. A summary of responses follows.

- Nine out of fourteen characterized themselves as completely (9) or partially (3) a manufacturing (as opposed to assembly) operation.
- Eleven out of nineteen were profit centers as opposed to cost reduction centers.

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[41] Interestingly, however, a 1997 study of transportation in the maquila sector entitled *Just-in-time Management and Transportation Service in a Cross-border Setting*, found that maquila managers with a high level of just-in-time management perceived that they had better transportation service in Mexico, than did the other managers. They hypothesize that just-in-time managers *have to* manage their transportation problems, and thus do so. (*Transportation Journal*.)

[42] Sklair (1989) gives a statistic of 17 percent, for example.

- Ten out of eighteen engaged in or were beginning to use just-in-time manufacturing techniques.
- Ten out of fourteen used Statistical Process Control or Continuous Process Control.
- Ten out of thirteen said that workers were engaged in quality control activities.
- Only one of fourteen firms were engaged in R&D activities at the plant (two others were beginning to do so).

Firms were then asked whether they had modernized their production processes since they had been in Mexico, by any of the following criteria: increased automation; increased use of computers or programmable machinery; or improved organizational or management techniques. Seven of the firms had not modified their production process in any way, but ten had modernized their production process on at least one of the three counts (five had done so on all three counts).

Our results are intended to be descriptive, but they support both the claim that Mexico is an environment where flexible manufacturing techniques can be used, and the claim that more needs to be done to attract this kind of industry. With a larger sample, an important topic for further research will be to examine the correlation between these kinds of firm characteristics/activities and the other themes of this paper such as location criteria, attitude toward the business environment; degree to which certain conditions interfere with the ability to conduct business; and sourcing decisions, etc. Understanding which factors are critical to which kinds of firms will lead to more specific and useful policy prescriptions.

Appendix I. Key Features of the Maquiladora Program.

The maquiladora industry is governed by the Decree for the Development and Operation of the Maquiladora Export Industry (the "Maquiladora Decree"), published on December 22, 1989, in the Mexican government Diario Oficial. The Maquiladora Decree was amended effective January 1, 1994, to comply with certain provisions of NAFTA. In addition to this decree, maquiladoras are governed by special provisions in the Customs Law and Regulations and General Customs Rules issued by the Department of Finance and Public Credit (Hacienda), as well as other laws in Mexico.(8) The key features are listed below.

1) *Maquiladora Registration Number*. In order to operate as a maquiladora, a Maquiladora Registration Number must be obtained from the Ministry of Commerce and Industrial Development (SECOFI). Only individuals who are Mexican citizens or companies incorporated under Mexican law may obtain a Maquiladora Registration Number.

2) *Maquiladora Export Program*. In order to obtain a Maquiladora Registration Number, a company must file a Maquiladora Export Program with the local SECOFI office where the maquiladora operation will be established or in Mexico City. The Maquiladora Export Program is a document containing information about the proposed maquiladora company. It describes the manufacturing process and the products to be produced and/or service to be performed, the list of raw materials and machinery/equipment to be temporarily imported into Mexico, stipulates the amount of labor to be used, and details an export program. Once approved by SECOFI, the Maquiladora Registration Number is issued and Mexican Customs is notified so that the company may begin its operations.

3) *Types of Merchandise*. The following types of merchandise may be imported temporarily on a duty-free basis under the maquiladora program:
   - raw materials and auxiliary materials (containers, packaging materials, labels and brochures necessary for the manufacturing/assembly of the product);
   - tools, equipment, production, and industrial safety accessories;
   - products necessary for hygiene, sanitation, and for the prevention and control of environmental contamination of the production plant;
   - work manuals and industrial blueprints;
   - telecommunication and computer equipment;
   - machinery, apparatus, instruments, and replacement parts for the production process;
   - laboratory, measuring, and testing equipment for the products and equipment necessary for quality control and for training of personnel and administration; and
   - trailers and containers.

4) *Simplified Customs Procedures*. Maquiladora imports qualify for expedited customs procedures. Maquiladora imports are exempted from many of the non-tariff requirements applicable to products imported on a permanent basis, such as Mexican official standards (NOMs). Also, maquiladoras are not subject to the value-added tax on raw materials, machinery, equipment, and other items imported under the program. Finally, maquiladoras are allowed to use a consolidated import declaration or "pedimento" and, upon prior authorization from SECOFI, are not required to classify the imported items under a specific Mexican Tariff Schedule number, but may import those items under a special tariff classification applicable to maquiladora imports.

5) *Geographic Location.* Until 1972, maquiladoras were restricted to the border states and the Baja California free trade zone. Under the previous Maquiladora Decree (superseded by the current Maquiladora Decree in 1989), maquiladoras could not be established in areas of high industrial concentration. Currently, however, maquiladoras may be established anywhere in Mexico provided environmental laws and regulations are met.

6) *Duration of Approvals.* Under the former Maquiladora Decree, approvals for Maquiladora Export Programs were valid for two years. Under the current Maquiladora Decree, approvals for Maquiladora Export Programs are open-ended. Subsequent importations under the program, however, do require approvals.

7) *Length of Temporary Importations.* The Maquiladora Decree and General Customs Rules permit fuels, lubricants, auxiliary materials, and spare parts used in production process to be imported for up to one year, and raw materials, parts, and components to be incorporated into the finished product for export, as well as containers, packaging materials and trailer boxes for up to two years. Machinery and equipment is permitted to remain in Mexico for as long as the Maquiladora Export Program is in effect.

8) *Period for Affecting the Initial Temporary Importation*. The time period affecting initial temporary importations listed in the Maquiladora Export Program (which the maquiladora will make to begin its operations) is one year from the time the maquiladora authorization is granted. There is, however, the possibility for what is usually a one time extension of three months upon prior authorization from SECOFI. In special circumstances, a second three-month extension may be granted.

9) *Subsequent Importations.* Subsequent importations necessary for the continued operations of the maquiladora require authorization from SECOFI for an extension of its Maquiladora Export Program. Approvals for subsequent importations are valid for one year for raw materials and two years for machinery and equipment. In other words, importations of these items must be effected within these time frames or a new authorization will be required. Only those items listed specifically in the Maquiladora Export Program or in the request for authorization for subsequent importations may be imported duty-free under the maquiladora program.

10) *Authorization in Dollars and Pesos.* Authorizations issued for temporary importations may be expressed in U.S. dollars as well as in pesos, provided the rate of exchange and the date are specified.

11) *Sales into the Domestic Market.* As a result of NAFTA, maquiladoras are allowed to sell an increasingly higher proportion of the amount of the prior year's exports into the Mexican market. Beginning on January 1, 2001, maquilas will be allowed to sell all of their production into the domestic market. When a maquiladora sells into the domestic market, however, it must pay the applicable Mexican import duties on imported raw materials used in the production depending on their specific tariff classification and customs value, as well as any other charges or taxes that are applicable. Finished products sold in the Mexican domestic market must also satisfy non-tariff requirements, such as the NOMs, and must be of the same quality as the finished products produced for export.

12) *Transfers Between Maquiladoras.* The transfer of merchandise, raw materials, equipment, and finished products between maquiladoras is permissible under the Maquiladora Decree. Provided certain requirements are met, such transfers may be treated as exports by the

transferring maquiladora and a temporary importation by the transferee. The transferee then becomes liable for any applicable import duties and other charges if the transferred merchandise is subsequently imported into Mexico on a permanent basis.

13) *Exportation of Waste and Scraps*. Waste and scraps which are not considered hazardous under Mexican law may be exported to the country of origin, destroyed, or donated to charitable or educational institutions, provided the applicable Mexican legal requirements are met. With prior approval from SECOFI, waste and scraps may also be sold into the Mexican domestic market. Waste and scraps considered to be hazardous must be exported to the country of origin.

14) *Recognition of Specialized Companies*. The current Maquiladora Decree recognizes the existence of specialized maquiladora companies, such as agro-industrial maquiladoras and companies involved in the exploitation of mineral resources, fishing and forestry, service maquiladoras, and companies operating as "shelters."

Source: NAFTA facts, http://proquiest.umi.com

Appendix 2. Mexican Surface Imports and Exports.

A2-1.Top ten U.S. state destinations for Mexican exports, 1997.
(Amounts are given in U.S. dollars)

All surface modes.

Destination State	Value (US $)
Texas	$18,178,340,277
Michigan	$12,758,067,096
California	$12,011,997,617
Arizona	$3,945,021,292
North Carolina	$2,916,559,045
Ohio	$2,481,239,669
Indiana	$2,440,782,082
Tennessee	$2,025,293,679
Illinois	$1,981,381,624
New York	$1,640,937,837

By rail.

Destination State	Value (US $)
Michigan	$9,313,818,318
Texas	$1,124,112,725
Arizona	$780,249,791
Tennessee	$401,526,369
California	$118,125,748
Kentucky	$142,336,904
Connecticut	$116,088,146
Georgia	$108,961,334
New York	$81,878,410
Pennsylvania	$61,085,782

By truck.

Destination State	Value (US $)
Texas	$15,394,563,430
California	$11,855,178,807
Michigan	$3,424,563,482
Arizona	$3,163,734,339
North Carolina	$2,910,286,291
Ohio	$2,447,991,775
Indiana	$2,420,509,877
Illinois	$1,792,454,349
New York	$1,555,360,095
Tennessee	$1,253,387,694

Source: Bureau of Transportation Statistics, U.S. Department of Transportation.

A2-2. Surface imports from Mexico, top ten commodities, 1997.
(Amounts are given in U.S. dollars)

All surface modes.

Commodity	Amount (millions)
Electrical machinery and equipment	21,112
Vehicles	14,113
Machinery and appliances	9,227
Apparel, not knitted or crocheted	2,906
Instruments [1/]	2,518
Furniture [2/]	2,226
Special classification provisions	2,218
Apparel, knitted or crocheted	2,068
Vegetables	1,347
Iron and steel	1,016

By rail.

Commodity	Amount (millions)
Vehicles	10,547
Machinery and appliances	697
Beverages	341
Copper	186
Iron and steel	143
Inorganic chemicals	140
Zinc	98.2
Articles of iron or steel	94.9
Coffee, tea, and spices	29.1
Salt, earth, stone, plaster, lime, and cement	44

By truck.

Commodity	Amount (millions)
Electrical machinery and equipment	20,013
Machinery and appliances	7,997
Vehicles	3,487
Apparel, not knitted or crocheted	2,902
Furniture [1/]	2,217
Special classification provisions	2,198
Instruments [2/]	2,120
Apparel, knitted or crocheted	2,067
Vegetables	1,345
Iron and steel	917

[1/] Includes bedding, mattress, light fixtures, signs, and prefabricated buildings.
[2/] Measuring, checking, precision, medical or surgical.
Source: Bureau of Transportation Statistics, U.S. Department of Transportation.

Appendix 3. Sample Truck Shipment Costs from El Paso, Texas, to Cities in Mexico.

City Name	Miles	Maximum Cost[1/]	Days from El Paso, Texas
Aquascalientes	871	$1,740.00	3
Cuernavaca	1,220	$2,400.00	5
Chihuahua	233	$552.00	2
Durango	748	$1,500.00	4
Delicias	233	$552.00	2
Guadalajara	710	$2,100.00	4
Leon	998	$1,920.00	5
Mexico (D.F.)	1,135	$2,220.00	5
Morelia	710	$2,100.00	4
Monterrey	746	$1,740.00	4
Puebla	1,220	$2,400.00	5
Queretaro	998	$1,920.00	5
San Luis Potosi	871	$1,740.00	3
Saltillo	746	$1,740.00	4
Toluca	1,220	$2,400.00	5
Zacatecas	746	$1,500.00	4

[1/] Maximum cost for a 28' truck. Rates include border crossing.
Source: Herman-MilesTrucking, Inc.

Appendix 4. Yearly Wages and Annual Wage Growth.

Year	Dollar cost/hour[1/]	Growth rate
1966	0.29	...
1967	0.29	0.00%
1968	0.34	18.37%
1969	0.34	0.00%
1970	0.42	24.15%
1971	0.42	0.00%
1972	0.49	17.50%
1973	0.52	5.23%
1974	0.71	36.72%
1975	0.82	16.01%
1976	0.84	1.44%
1977	0.62	-26.03%
1978	0.69	12.31%
1979	0.79	14.39%
1980	0.89	11.90%
1981	1.12	25.61%
1982	1.40	25.43%
1983	0.66	-52.61%
1984	0.69	4.40%
1985	0.73	4.84%
1986	0.50	-31.84%
1987	0.49	-1.52%
1988	0.53	7.77%
1989	0.55	4.23%
1990	0.57	3.32%
1991	0.60	5.74%
1992	0.64	7.34%
1993	0.67	5.06%
1994	0.72	6.14%
1995	0.42	-41.98%
1996	0.43	3.66%
1997	0.49	13.47%
1998	0.54	11.07%

[1/] Based on a 48-hour work week.
Source: *Twin Plant News*, January, 1999.

Appendix 5. Labor Costs.

Direct Payments **Entry-level worker**

Description			Annual	Daily
Working days		298	8,999.6	30.2
Sundays	Paid days/year	52	1,570.4	5.27
Holidays	Paid days/year	9	271.8	0.91
Vacations	Avg. first year	6	181.2	0.61
25% vacation premium	Over vacation pay		45.3	0.15
Christmas bonus	Paid days/year	15	453	1.52
Profit sharing	10 days x 70%	10	211.4	0.71
Subtotal			**11,732.7**	**39.37**

Fringe Benefits to the Employee

Attendance bonus			2,198.56	7.38
Monthly food coupons			869.94	3.01
Lunch subsidy			1,802.03	6.05
Savings fund			1404	4.71
Subtotal			**6,301.53**	**21.15**

Indirect Tax Payments by Law

Housing institute			576.06	1.93
Savings for retirement			230.42	0.77
Disability and Retirement			492.53	
Social security	52 weeks			
Employee part (minimum wage only)	137.79	1.2500%	including fixed 13.9% mw	
a) Sickness/maternity	1532.75	1.7500%	including fixed 13.9% mw	
b) Disability and life	201.62	1.7500%	including fixed 13.9% mw	
c) Work type risk rate	62.62	0.5436%	including fixed 13.9% mw	
d) Daycare contribution 1% integrated salary	115.21		2049.99	6.88
Subtotal			**3349**	**9.58**

Direct Taxes Paid by the Employer

1.4375% State Tax calculated over the total of salary & benefits except food coupons and lunch subsidy			220.44	0.74
Subtotal			**220.44**	**0.74**

TOTAL COST

Total	**21,603.67**	**70.84**

	Pesos	Burden	Equivalent in US$
Cost per day	**70.84**	**134.58%**	**8.63**
Cost per hour	**8.86**	**134.58%**	**1.08**

Source: PROCONSULT, Enrique Mier y Teran, obtained from Tijuana Economic Development Corporation, 1998.

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